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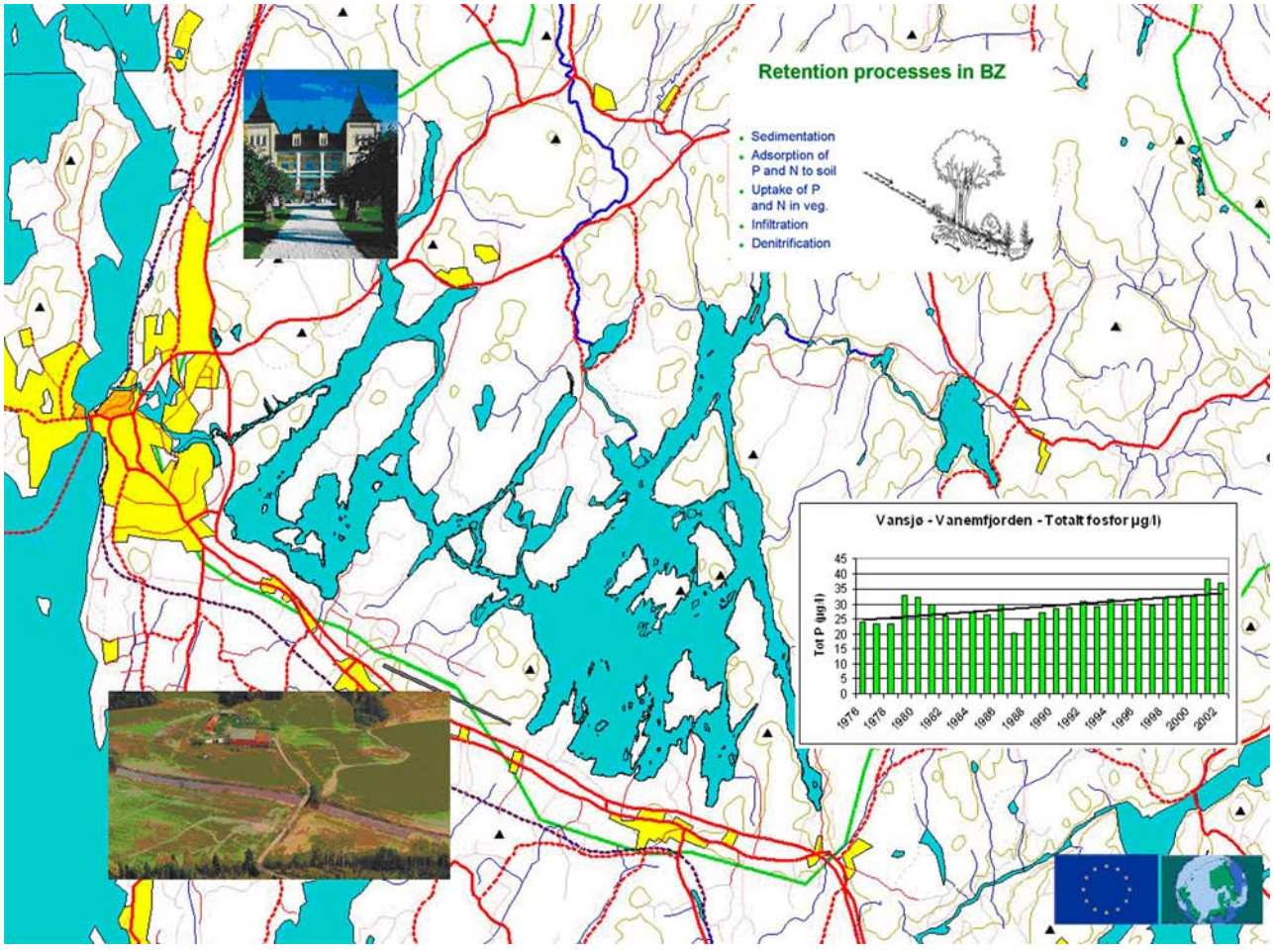
NOLIMP

Summary from a Workshop on Public Participation and Water Quality



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REPORT

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Abstract

The first NOLIMP expert workshop on 'Public Participation' and 'Water Quality' took place in Moss (Norway) 6-8 October 2003, and attracted 40 delegates from The Netherlands, UK, Denmark, Sweden and Norway. The delegates, which had their background from both science and administration, shared their experiences with public participation in river basin management and discussed the new development of a pan-European typology for river, lake and marine waters and exchanged information about the ongoing monitoring in the respective pilot areas.

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1. Aktiv involvering	1. Public participation
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NOLIMP

Report from a Workshop on ‘Public Participation’ and ‘Water Quality’

Preface

The *North Sea Regional and Local Implementation of the Water Framework Directive* (NOLIMP-WFD) is a project funded by the North Sea Programme of the European Regional Development Fund-INTERREG IIIB, and aim to show practical approaches to the implementation of the EU Water Framework Directive as well as improving water quality in pilot water systems.

The first NOLIMP expert workshop on 'Public Participation' and 'Water Quality' took place in Moss (Norway) 6-8 October 2003, and attracted 40 delegates from The Netherlands, UK, Denmark, Sweden and Norway. The delegates, wich had their background from both science and administration, shared their experiences with public participation in river basin management and the new development of a pan-European typology for river, lake and marine waters. The exchange of information about the ongoing monitoring in the respective pilot areas was also a topic for the workshop..

I would like to acknowledge the effort made by all participants for presentations made on the diverse topics and for the interesting exchange of information that took place during the workshop. A special compliment goes to Ms. Anja Skiple, who did most of the practical preparatory work for the workshop.

Oslo, March, 2004

John Rune Selvik

Contents

Summary

The objective of the workshop in Moss (Oslo, Norway) was to ensure exchange of knowledge and experiences on “Stakeholder participation” and “Water Quality Criteria” related to implementation of the Water Framework Directive on local and regional scale.

Public participation
The amount of public involvement depends on the development phase of the project and on the nature of the development project itself. The directive requires consultation and access to information, and encourage active involvement by the stakeholders and the wider public.

The experiences among the NOLIMP partners show the importance of encouraging active involvement and ensuring consultation and access to background information throughout the process. Stakeholders should be involved as early as possible in the process, especially when active involvement is considered important.

Reconstruction of a natural landscape in the Lake the lejon area was reported to require active public involvement in order to achieve consensus on plans. The process was time consuming, and after a five year planning period it was foreseen a five to ten years period to reconstruct farmers land, buy and exchange land, make new roads and recreation facilities and improve the water management.

In Norway, The Morsa catchment project empasises the importance of ensuring that all relevant end-users and stakeholders are included and regularly informed about the activities, and that expectations regarding their contributions to the different processes are understood by the project organisers.

It is also focused on the importance of developing a common understanding of the problem to solve among all parties involved. This would require an adequate and agreed scientific basis for the assessments leading up to the proposed measures to be implemented.

The Vilsted lake project is considered as a successful example of public involvement in Denmark. The close dialogue between administrators and the public was considered an important factor for achieving consensus on plans and actually include ideas from various stakeholders.

The Ythan project in Scotland aims to involve local people in protecting, restoring and enhancing the river Ythan. One experience is to fit the practical public participation to the people involved, not the other way round.The importance of involving people in real decisions was also expressed.

Experiences from Sweden encompass the importance of supplying the public with information on a regular basis and that simple analytical approaches can be used to differentiate between the requirements of different stakeholders.

In the science of planning theory communicative planning is about a real and equal dialog and communication between different actors, and to build a mutual understanding of each others arguments and perception of reality. It proves that participation is very important, both from the point of democracy and from the point of efficiency in how to meet desired water quality objectives. Active participation and involvement is particular an important tool for changing attitudes and make water users and water polluters accountable for environmental issues. Despite this fact it should be noted that public participation is not an easy issue, and some practical experience with local planning processes in Norway indicate that participation also can lead to even more power to already powerful actors. It is important with a careful assessment about what is the objective of any participation, which actors should be involved and how should they be involed.

Water quality
The WFD intends to prevent the further degradation of aquatic ecosystems, while at the same time protecting and enhancing existing water quality. However, the directive introduces a new focus on "ecological status" for surface waters and "ecological potential" for heavily modified water bodies. This emphasis on ecology presents a particular challenge since water has traditionally been assessed on the basis of its key chemical parameters. Yet the WFD calls for the assessment of ecological status based on a number of biological quality elements supported by water chemistry parameters.

The danisch Mariager Fjord was presented as a case study in which many of the WFD principles had been applied (irrespectively of the WFD implementation in Denmark). In the Mariager Fjord, the secchi depth is a measure for the amount of phytoplankton in the water and is thereby a good indicator for the present stadium of the water quality. When the amount of phytoplankton is reduced it will mean an improved condition for both oxygen and light in the fiord and the risk of extensive deoxygenation will improve. In order to obtain a target secchi depth of 4 metres in the Mariager Fjord, which correspond to good oxygen condition and good condition for eel-grass, the Counties of North Jutland and Århus asked DMU (Danish National Research Institute) as a consultant to make a model consisting of an empiric relation between the secchi depth and the load of nutrients from land. With this model, different approaches for abatement planning in the catchment could be assessed.

The Morsa catchment in Norway had been a pilot area for test implementation of the principles of the WFD. Fact sheets describing characteristics for most types of Norwegian lakes and rivers, had been developed up front of the pilot study. These fact-sheets contained type-specific fauna, flora and physico-chemical elements from lakes in pristine areas. Pressures was not analysed in detailed, but assessed on the basis of some predefined indicatiors (agriculture activity, number of inhabitatnts etc). Pressures and possible impact was presented in a simple score table as a basis for assessing which lakes or rivers that are at risk for not meeting the WFD target by 2015.

NOLIMP Workshop 6th-8th October 2003 in Moss, Norway

The NOLIMP project organises workshops for its partners each year in order to discuss and exchange information on key topics.
The objective of the workshop in Moss (Oslo, Norway) was to ensure exchange of knowledge and experiences on "Stakeholder participation" and "Water Quality Criteria" related to implementation of the Water Framework Directive on local and regional scale.

Public participation in water management has over time proved to be an important issue for sucessful rehabilitation of disturbed /polluted waterbodies. The Water Framework Directive require public "access to information" and to "consult the public" in management issues. The directive also encourage public "involvement/participation" in water management issues. The NOLIMP partners and their work related to the pilot basins has accumulated considerable knowledge and experience on different facets of this issue. It follows that exchange of knowledge will improve the platform for further development in each pilot basins.

The timetable in the directive for characterisation of waterbodies give little room for trial and error. It follows that exchange of information and experience will be beneficial for the implementation process. Much effort is laid down internationally in order to develop guidance on this topic. Despite of the international guidance documents on this topic, which has become available during the last year, adaption to national conditions still need to be implemented. The practical application of the directive reveals challenges regarding data availability and assessment of it. It appears that it is still early in this process and less information of the experience has yet become available on the topic.

During this workshop we have tried to accumulate some information that is expected to be of common interest based on the discussions and presentations made in the two parallell sessions on "Stakeholder participation" and 'Water Quality Criteria".

1. Stakeholder Participation in Water Management

The session on Stakeholder participation was chaired by Date de Vries from the Municipality of Smallingerland in The Netherlands.

The following questions were tabled as a starting point for discussions in the session on Stakeholder Participation:

- Who is identified as stakeholders in your case studies?
- How to involve stakeholders?
- At what stage should the different stakeholders be involved?
- Give examples on communication of information to stakeholders
- Preconditions and obstacles to effective involvement and participation

The main outcome of these discussions is presented. in the following sections.

1.1. Who is identified as stakeholders in your case studies?

Stakeholders can be categorised as having direct or indirect interest. Stakeholders with direct interest are for example agriculture, local governments and fisheries. Examples of stakeholders with indirect interest are tourists and residential communities.

Every NOLIMP-partner should make a list of stakeholders in the pilot projects and make it available for NOLIMP partners.

It is also mentioned that politicians are important stakeholders. We should also invite them into the proces, e.g. in future workshops. One viewpoint presented that the Water Framework Directive was achieved badly by the politicians, and and that it was a challenge for water managers to convince politicians about the excellence of the directive for managing water in a harmonised way throughout Europe.

1.2. How to involve stakeholders?

The amount of involvement depends on the level the project is in and depends on the issue. Several examples are mentioned and grouped by the main forms of public participation of the Water Framework Directive:

- Active involvement: workmen's hut (lots of local knowledge, see example Vilsted Lake Project, Denmark), schools (for monitoring and takes samples, see example Ythan Project, Scotland), workshops;
- Consultation: workshops, discussion boards
- Access to background information: leaflets, newspapers, news letters, maps, poster displays, packs of information, develop material at library's, schools and other public places.

It is important to ***encourage*** active involvement and ***ensure*** consultation and access to background information.

During discussions a number of other useful statements were presented:

- use umbrella groups, key groups and key persons. A adequate analyses of which person or organisation is important here;
- divide into passive and active involved groups and persons;
- don't give too much power to the powerful groups and persons;
- be accurate with information: always give the same information on the different groups and persons;
- try to give information at unexpected places like for instance fairs, agricultural shows and festivals.

1.3. At what stage should the different stakeholders be involved?

The answer is simple: As soon as possible in the process. This is also mentioned in the paper of the Water Framework Directive (Guidance Document on Public Participation). Let the stakeholders decide how to be involved in the process and at which point, also let them discuss en decide at the stage of the projectplan.

1.4. Examples on communication of information to stakeholders

Examples of communication of information to stakeholders are:

- internet discussion board;
- workmen's hut;
- workshops;
- schools (for monitoring, taking samples, presentations);
- visiting people at home to give information;
- leaflets, newspapers, news letters, maps, poster displays and packs of information;
- develop material at library's, schools and other public places.

Other useful statements that was presented in the discussion at the workshop:

- avoid information overload;
- adapt the language to the audience: technical expressions may confuse the audience and be an obstacle for perception of the message;
- make invitations for workshops and discussions sound attractive.

1.5. Preconditions and obstacles to effective involvement and participation

A small table was created in order to illustrate the need for facilitating the process of involvement. In order to ensure optimal involvement there are both obstacles to overcome and there is a need to demonstrate benefits of participation in the process to those involved.

Preconditions	Obstacles
Awards / Carrots	Time
Events/Festivals	Resources
Benefits for the local gouvernment	Differences between local and regional government
	Project is too far away, different levels in abstraction

The table below shows various stages that might be considered when planning or evaluating stakeholder participation for localised projects. The table can be used as a checklist for planning consultation or as a means of briefly recording a consultation process and its subsequent evaluation. The intention is that various methods of engagement, and the success of the technique applied, are recorded and disseminated amongst the partners such that all can benefit from both positive and negative experiences.

Table 1. Planning how to ensure public participation is important. Development of an overview table regarding different stakeholders can be used as guidance for a particular case or consultation method.

1	2	3	4	5	6	7	8
TOPIC / ISSUE	**STAKEHOLDER CATEGORY**	**LEVEL**	**STAGE OF INVOLEMENT**	**METHODS / ACTIVITY**	**PRECONDITIONS**	**OBSTACLES**	**EVALUATION / MONITORING**
Wetland creation, land reclaimation, general water quality improvement projects, biodiversity action plans	Direct e.g. local government, water authorities, NGOs landowners, fishery boards, forestry and agricultural bodies businesses, politicians Indirect e.g. local residents schoo children, tourists Involvement: catchment wide or specific localised issue	National RBD / catchment sub-catchment / local	Awareness raising, information supply Consultation Active involvement	Posters, leaflets, press releases, websites, newsletters Meetings, interviews, questionnaires, seminars, school visits, websites, open events, themed site visits Contribute to planning decisions, Biodiversity Action Plans, assist with monitoring, planting, landscaping, peer workshops	Feedback necessary Views and options fed into decision making Effort invested has positive effect on environment Links to any existing processes e.g. Community Planning Carrots / awards, events with free gifts	Time Resources: money & staff Restrictions in reaching the targeted stakeholders Fit with existing legislation Scale of issue to be resolved	Proportion of local population contributing to questionnaires, attending meetings – and subsequent increase Increase in awareness of environmental issues and initiatives Extent that participation influences decision making

Table 2. Case Study Example

1	2	3	4	5	6	7	8
TOPIC / ISSUE	**STAKEHOLDER CATEGORY**	**LEVEL**	**STAGE OF INVOLEMENT**	**METHODS / ACTIVITY**	**PRECONDITIONS**	**OBSTACLES**	**EVALUATION / MONITORING**
Tarland new WWTP – type of plant and siting	Local community	Sub-catchment	Inform & consult	Community consultation meeting & questionnaire	Opinions, views will affect decision making process Feedback on response will be given	Reaching target audience – advertising of event Request for resident's free-time	Attendance at present & subsequent meetings Increase in awareness of WFD?

2. Some practical case studies related to public participation

2.1. Struggle for wet land in the Netherlands (by Arend Timmerman)

Who doesn't know the story of the fight of the Dutch people against the sea? They are real dike builders and water pumpers. It is part of their living: It is sink or swim…. you can find dikes everywhere in the Netherlands. Until the seventies of the last century, every locale authority claimed more land, especially for agriculture. Land was reclaimed from sea or a lake areas, but the reclaimed land became low, mostly bad, agriculture land. It was always shallow water and marshland with a high value of nature and landscape that was transferred to agriculture land. Such a development took place around the lake Leyen; our Nolimp-project pilot area.
However, the central government has made new plans for saving nature and landscape the last twentyfive years. A lot of investments was made all over the country in the same period in order to bring progress in the agriculture business. Investments were also made to realise a wet and clean ecological structure in the Netherlands. This was a very difficult job with a lot of opposition, but circumstances have changed and people have adopted to the new situation.

It is considered necessary to have a modern stock farming business in the Netherlands in general and this is also the case around the lake the Leyen. Nowadays stock farming has adopted a system of use of improved landuse and less pollution. Fifteen years ago, the local farmers and authorities made plans to reorganize their business. They knew that their plans could not be relised if they did not cooperate with the environmental plans made by the government. The local authorities, the farmers and the local nature and environment organisations made some draft plans. These plans where discussed in a number of meetings; some of them with an invitation for the authorities and some only for the participants in the project. It took almost five years before consensus for the plan was reached and finally the real implementation could start. The plan still encompassed elements that was hard to accept for everybody, and a period of five to ten years is propably necessary to carry out the reconstruction of farmers land, to buy and exchange land, to make new roads and recreation facilities and to improve the water management. Nature conservation an reconstruction was also elements of the last planning period, and on the north side of the lake Leyen the financial situation enabled the realisation of these plans. .

What about nature reconstruction? What sort of nature do the people want? Will recreation benefit from nature reconstruction? The nature and landscape in and around the lake is very vulnerable. Plans prepared by the National nature and forestry, who are experts on the reconstruction of the ecological structure and how to manage it, were often not accepted. About ten years ago, the strategy on nature reconstruction was changed and now the National nature and forestry stimulate the participants in the project and the region to make their own reconstruction plan. Of course it is necessary to give the best guidance in order to construct manageable systems. In this case these challenge succeeded! In 1996 the region representatives for nature en environment published a report on the reconstruction of the ecological main structure on the north side of the lake. A plan with an economical frame of 200.000 euro; much more than was originally planned; was accepted by all parties and realised in 1998 based on funding from eight Sponsors. This procedure was the first one with full public participation in the province of Fryslân - and we all liked it. It was a very good procedure for building up a territorial landscape; good for nature and good for man. After the reconstruction even a part of the nature is now managed by the farmer's organisation. They have a long contract for it with the National organisation.

2.2. Public participation in relation to the pollution abatement planning in the catchment of Lake Vansjø in Norway (by Nils Vagstad, John Rune Selvik and Helga Gunnarsdottir)

Decreased water quality due to long-term elevated phosphorus inputs from the catchment area is the main problem linked to the management of lake Vansjø and the Morsa catchmemt.

Figure 1. Mass occurance of bluegreen algae in Lake Vansjø is a clear signal of detoriarated water quality. Photo: J.R.Selvik

2.2.1. Scope

The Morsa project was established in year 1999.The scope of the project is to improve the water quality of Lake Vansjø and its tributaries in order to make it more suitable for a range of end-user needs. In particular, the reduction of the phosphorus load into the lake is a priority issues given the fact that frequent blooms of potentially harmful algae may pose a risk to the 60 000 inhabitants abstracting their drinking water from the lake.

2.2.2. Approach

The project pinpointed in its initial stage one crucial issue decisive to its success: The shared responsibility and the firm commitment from the various end-users and stakeholders linked to the water resources and the land resources in the catchment area. These include stakeholders linked to different types of economic activities (e.g. agriculture), the political and administrative organisation at municipal and county level and last but not least, the different NGOs being involved in the area. In particular, the involvement of stakeholders representing the types of activities with potential influence on the water quality was considered paramount to the project. Furthermore, it was considered important to establish a common platform in terms of problem understanding, i.e. a sound scientific basis for the environmental impact assessment and the proposed measures to be implemented.

2.2.3. Organisation

The project organisation consists of a board, specific task forces and a project co-ordinator.
The board includes the mayors of the seven involved municipalities and representatives of the county administrations of the two involved counties. The key responsibility of the board is to direct and monitor the progress of the project, in addition to provide the necessary political support for proposed actions.

There are four task forces linked to the project organisation:
- Wastes and waste water treatment
- Agriculture
- Forestry
- Water resources

The key role of the task forces is to identify and implement appropriate actions and measures within their specific domain at local/municipal level.

The key responsibility of the project co-ordinator is to facilitate the communication between the various end-users and stakeholders, and the different bodies within the project organisation, besides the ordinary tasks linked to project co-ordination.

The river basin management plan

2.2.4. General

A river basin management plan was prepared including the following phases of work:

- Problem identification, user interests and potential conflicts of interests
- Assessment of reference conditions and required reductions in nutrient inputs to meet the quality targets defined on the basis of specific user standards
- Screening and subsequently quantification of major pressures
- Analysis of possible measures and quantification of potential reductions in nutrient inputs including the costs of these measures
- Implementation of measures

The preparation of the river basin management plan was supported by the contribution from several research institutes, and involved the different task forces of the project organisation and relevant NGOs such as the farmers union. Once adopted by the board of the project organisation, the action plan was made operational and thus incorporated into work of the political and administrative level in the seven municipalities.

Figure 2. Constructed wetland near lake Vansjø. Photo: J.R.Selvik

2.2.5. Lessons learned

The Morsa project may provide useful information based on its experiences with key factors for the successful implementation of a river basin management plan. Some of the lessons learned may be summarised as follows:

- ensure all relevant end-users and stakeholders are included and regularly informed about the activities, and that expectations regarding their contributions to the different processes are understood;
- identify possible bottlenecks for the implementation of the river basin management plan at an earliest possible stage, and ensure that appropriate resources are devoted to overcome these possible bottlenecks;
- a shared vision based on a common problem understanding is a paramount, as is the shared responsibility for the management of the water resources. This would require an adequate and agreed scientific basis for the assessments leading up to the proposed measures to be implemented, and
- a river basin management plan needs a long-term perspective. This long-term perspective should also be reflected in the mode of work and how the different stakeholders and involved parties are being approached.

It may, in the long run, be more "sustainable" that measures are being implemented by convincement rather than by enforcement, although such a process can be more time consuming.

2.3. The Vilsted lake project in Denmark

The Vilsted lake project is considered as a successful example of public involvement in Denmark.

The project is is dealing with the reestablishment of a 900 hectare wetland system. The system is expected to be established in 2005 and involves 155 landowners.

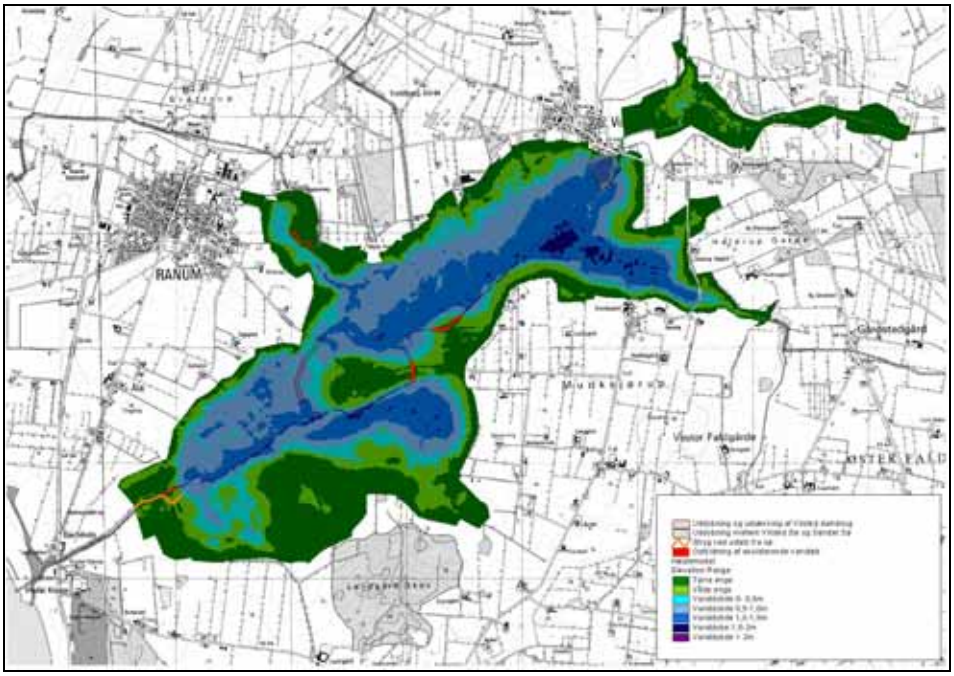

Figure 3. Planning for a the establisment of a new wetland

The public was involved from the beginning of the project. A Discussion paper was Introduced together with the ”Workmen's hut” model and a large public meeting. The public debate closed with a political decision.

The socalled Workmen's hut model encompassed the establishment of a tent with a week long exhibition of plans and experts available for questions.

Figure 4. Description of plans were Made available in a publication dedicated for public debate.

The advantage of this approach was to:

- two way communication;
- giving answers to many questions from the landowners and farmers particularly, and
- mapping ideas and requirements from the stakeholders.

Figure 5. Workmans hut.

Figure 6. The exhibition in the workmans hut created much public interest.

2.4. What have we learnt in Aberdeenshire?

The Ythan project is funded by the European Commission's Life Environment fund and aims to involve local people in protecting, restoring and enhancing the river Ythan. The project is funded from August 2001 until January 2005 and is managed by a partnership of organisations which includes:

Aberdeenshire Council
Forest Enterprise
Formartine Partnership
Macaulay Land Use Research Institute
River Restoration Centre
Scottish Environment Protection Agency
Scottish Natural Heritage
Ythan District Fishery Board

Figure 7. The Ythan Estuary at Waterside Bridge Newburgh.

Various public participation techniques have been used in the Ythan Project:

- Building a project on local people's ideas;
- involving people in decisions about how to deliver the project;
- raising awareness of what individuals can do, and

iInvolving local people in the science.

The main experiences was:

- Need to fit the participation to the people, not the other way round;
- need to involve people in real decisions;
- may need to raise awareness so that everyone can participate, and
- may need to address a lack of interest in some sectors.

Figure 8. Raising awareness through activities at school is an interesting and positive approach.

Figure 9. Social events increase awareness.

Figure 10. Public involvement in active work with the river create awareness and engagement in the processes.

2.5. The Swedish pilot basin (Dirk Harmsen)

Project management is hadled by 'länsstyrelsen Västra Götaland' and it is established a steering group with members from political parties. In addition, a reference group is established with participation from interest holders (Research institute Kristineberg, Hushållningssälskapet, Fishery Agency, SUCOZOMA, Municipalities, Forestry Agency, LRF farmers organisation)

The themes covered by the project are forestry and water, rain water disconnection and individual sewage.

Länsstyrelsen Västra Götaland issues a regular publication ('Miljömagasinet Vest'), which contain environmental news and is directed to the public.


MILJÖ

Nya hummerrov
i Göteborgs skärgård

Figure 11. 'Miljömagasinet Vest' has approx. 2000 readers

Stakeholders has been sorted and analysed in a WFD perspective following these three principles:

1. Sort after problem intensity
2. Those who are responsible should solve the problem
3. Stimulate hearts and brains

A number of environmental issues has been listed (e.g. eutrophication, acidification) and the various stakeholder that has an interest in each topic has been listed. Following this, all polluters under each topic has been identified and joined in 'cluster-groups' for further work on how to solve each problem.

2.6. Public participation in relation to the Water Framework Directive and the Norwegian Planning and Building Act (Knut Bjørn Stokke, NIBR, Norway)

2.6.1. Introduction

In this section some general questions about public participation related to implementation of the Water Framework Directive in Norway is highlighted. These questions also have relevance to the implementation process in other countries as well. In this perspective, I will focus on the Norwegian Planning and Building Act, who seems to be a very important implementation-equipment in Norway. This act regulates a comprehensive and cross-sectoral ambition to land use planning. Over time, more and more sector-acts about land use regulations have been integrated in planning in relation to the Planning and Building Act. A main purpose is to establish one common and superior law for land use planning (i.e. NOU 2003:14).[1] The purpose for this planning is to "provide a basis for decisions concerning use and protection of resources and concerning development" (Planning and Building Act § 2). Many of the local and regional watershed plans in Norway are now organised in relation to this act. One important argument to organise watershed plans in relation to the Planning and Building Act is the ambitions in this law in involving all relevant stakeholders and the public in the planning processes.

Also the Water Frame Directive highlight public participation and involvement, and in this paper I will compare the ambitions in the Directive with the ambitions in the Norwegian Planning and Building Act. Further, I will lighten some general questions and possible oppositions that could be useful to take into consideration in the implementation process. I will also suggest some recommendations about what kind of participation who could be applicable on different administrative levels, based on a work with the pilot project for the Water Framework Directive implementation in the Morsa watershed (NIVA 2003). In that connection, it is a particular focus on participation at the river basin level and the Morsa waterhed. Questions concerning participation in management of (greater) river basin districts will only be mention very shallow. In this paper, I will either not mention different techniques in public participation. Such aspects are exhausted mentioned in the e-mail attachments to this meeting (the EU Guidance document of public participation 2002).

2.6.2. Public participation in relation to the Water Framework Directive

It is Article 14 in the Directive who is about public participation, even though the word 'participation' is not explicit mention. Instead the concept 'public information and consultation' are used. Point one

[1] The ambition is, however, not only to be the superior law for land use planning, but also for the non-physical planning at the local and regional level. A NIBR study indicates a substantial gap between ambitions and realities. In practise, it is the physical elements in the law who dominate (Falleth & Stokke 2001).

in Article 14 mention, however, 'active involvement of all interested parties…in particular in the production, review and updating of the River Basin Management Plans'. 'Member States shall ensure that, for each River Basin District, they publish and make available for comments to the public, including users:

- A timetable and work programme for the production of the plan, including a statement of the consultation measures to be taken, at least three years before the beginning of the period to which the plan refers;
- an interim overview of the significant water management issues identified in the river basin, at least two years before the beginning of the period to which the plan refers, and
- draft copies of the River Basin Management Plan, at least one year before the beginning of the period to which the plan refers.

'Upon request access shall be given to background documents and information used for the development of the draft River Basin Management Plans'. The Directive claims transparency during the work with the plan, both the political and the more technical. In accordance to Article 14 point number 2, Member States shall allow at least six months to comment in writing on those documents in order to allow active involvement and consultation.

What the Directive claims of responsible governments, seems also to be an obligation to access to information related to the planning process, important issues and draft plans. Stakeholders and the public are given an access to information and consultation. The Directive seems not to claim the responsible authorities to facilitate more *deep* involvement and participation, even though active involvement of all interested parties is a purpose in the Directive. In that connection, the EUs Guidance to Public Participation point out that the Member States have to encourage active involvement.

2.6.3. Participation in relation to the Norwegian Planning and Building Act

Information and consultation in the planning process is also the central participation methods in the Norwegian Planning and Building Act, even though § 16 mention that 'the planning authorities shall make an active effort at an early stage of the planning work to inform about the planning activity…Affected individual persons and groups shall be given an opportunity to participate actively in the planning process'. In planning related to the Planning and Building Act, the general public are to be informed while those affected are to be given the opportunity for more active participation. What active participation should really mean in practice, the law say nothing. Some case studies have shown that the intention of active participation not always is working out in practise as presumed (NOU 2001:97). In the suggestion to new legislation, the planning authorities shall in greater extent have a duty to prepare for active participation, i.a. to strengthen the early phase in the planning process by working out a planning program which point out the most important planning issues (ibid.:7). The planning program should act as a base for the formal planning process.

In consideration of the municipal master plan[2], "the municipality shall make sure that the most relevant matters in the municipal planning work are made known in a manner that it finds appropriate, to enable them to become a topic of public debate…in good time before the plan is consider by the municipal council" (§ 20-5). Further, the paragraph says: "The draft municipal master plan shall be sent to comment to stakeholders having a particular interest in the planning work, and shall be made available for public inspection". This procedure is also valid for local watershed plans, which is organized as part plans in relation to this act.

[2] The municipal master plan is legally binding for landowners and land use activities, and is the most important land use plan in Norway. Every municipality shall make this sort of plan for their whole area.

When it comes to the county planning[3], the county municipality shall as early as possible during preparation of the draft plan make known the proposed goals for development in the county, and, be presented in a form which makes them suitable as a basis for public debate (§ 19-4). In connection with consultation, the draft county plan is submitted for comment to stakeholders that will be affected by the proposal.

2.6.4. Some comparative elements

All this formal regulations take into consideration, the Water Frame Directive and the Planning and Building Act seems to be quite *similar* in relation to public participation in the planning processes. Both mention active involvement by stakeholders, but without concretize what this really means. The emphasis is on information, publication and consultation. Both emphasise, however, that the draft plan shall be made available early in the planning process. In this connection, the Water Framework Directive is more detailed concerning point of times and time limits when it comes to make the planning issues known among stakeholders and the public compared with the Planning and Building Act. This is the same when it comes to the opportunity for stakeholders and the public to give comments to draft plans.

Information, publication and consultation is minimum requirement, but it could be good arguments to operationalize the guidelines in the Planning and Building Act and the Water Framework Directive in involving stakeholders and the public in the planning processes in a more active way. The two main arguments for this are out of consideration of both democracy and efficiency. The intentions for active participation in the Planning and Building Act are, according to (Holsen & Swendsen 1998), to ensure the democracy aspects[4], create better plans and to ease implementation of the plan because all involved parts will have had the opportunity to influence the result (the two last parts is related to the efficiency argument). Holsen (1996) has studied the legislative history to the Planning and Building Act, and he claims that efficiency arguments have dominate the democracy arguments. The consideration to mutual and social learning has also been an important aspect.

According to the Directive, information supply and consultation are to be ensured, while more active involvement and participation have to be encouraged. According to the EU Guidance document on Public Participation, active involvement means that stakeholders actively participate in the planning process by discussing issues and contributing to their solution. It seems that the efficiency argument for participation seems to be the major argument for why more active participation is encouraged: “It is a means of improving decision making, to create awareness of environmental issues and to help increase acceptance and commitment towards intended plans”…”the fundamental rationale for undertaking public participation, which is to ensure the effective implementation and achievement of the environmental objectives of water management…and to improve decision-making” (the EU Guidance, page 4 and 21). Preamble 14 highlights the fact that public participation will contribute the overall success of the Directive (the EU Guidance document on Public Participation). In that connection, stakeholder participation could ensure local foundation to the management, which is an important general purpose in the Directive.

[3] The county plan is not legally binding, but this opportunity is discussed in a new suggestion for review the law NOU 2003:14). The plan “shall serve as a guideline for municipal and national planning and activity in the county” (§ 19-6).

[4] Democracy through participation can, however, be interpreted as an intervention in the principle of steering by the elected representatives, but the intention in the law is to give the politicians a better decision background, by getting so much knowledge about the inhabitants’ needs, interests and viewpoints as possible (Holsen 1996).

2.6.5. Other questions

How "deep" should the participation be?
The concept participation covers a lot of differences in opinion. In EUs Guidance document on Public Participation define public participation as allowing people to influence on the outcome of plan and working processes. In that connection, there are different levels of influence. Kleven (1990) distinguish, in increasing order, between publication, information, discussion/dialog, co-operation/co-determination and self-determination. The EU Guidance distinguishes between information supply, consultation and active involvement.

By active participation, they distinguish between participation in the development and implementation of plans, shared decision-making and self-determination. "Encouraging the first should be considered the core requirement for active involvement, the latter two forms are not specifically required by the Directive but may often be considered as best practice" (The EU Guidance, page 20). Another distinction in active involvement and deep participation is:

- Discussion meetings/popular meetings
- Participation in working groups/reference groups
- As partners in a co-operation

The first, discussion meetings/popular meeting are an arena for information and dialog between the authorities and the public (or parts of the public). In this arena, the authorities get an opportunity to introduce about the important planning issues, and get response from individuals and/or groups. In 1997, 78 % of the municipalities in Norway organised such form of participation in the process of the municipal master plans (Sommerfelt & Knudtzon 1997). This is also a quite normal participation-method in Norwegian municipality planning. Participation by representation in working groups etc. is not that normal, only 28 % (ibid.).

Participation through partnerships is, as far we now, quite seldom in planning processes in Norway. This deep form of participation require, as the EU Guidance also point out, a change in attitude among the responsible governments. "Many governments authorities have realized that the "command-control" resource management systems prevailing in the 1960s and 1970s…For those in powerful positions to adopt a non-dominating, learning attitude may even entail personal change among staff. This implies that water managers need to be technical experts *and* process managers" (EU Guidance 2002:58). Stakeholders as partners are, however, a very deep and demanding form of participation, and one important question in that connection is who should be involved as partners (and other deep forms of participation). It is obvious that not all parties in the community can participate on this way. Active involvement also deals with *when* in the planning process the public should be involved. Both the Planning and Building Act and the Guidance document recommends that public participation should be started early in the planning process. The EU Guidance document recommends involving stakeholders early in setting the terms of reference, i.a. to share each others expectations.

Who should be involved?
To lighten this question, it may be fruitful to distinguish between the democracy- and the efficiency-arguments to participation. While the democracy-argument calls for the equal right of all relevant and affected actors to participate, the efficiency argument may call for involvement of those actors who are particular important concerning implementation of the necessary measures to reach good status in water quality. The purpose is to ensure more accountability among users. This was the central argument in involving only representatives for farmer organisations in management of the Morsa watershed (NIVA 2003). Too many partners could also be in opposition with the aim of decision efficiency.

According to the EU Guidance document, the Directive is prescriptive in the sense that at least *stakeholders* should be involved when dealing with active involvement. In that respect, they suggest to work out a stakeholder analysis for each river basin districts (se Annex 1 in the EU Guidance document). "A stakeholder will generally have an interest in an issue because he/she or it is either affected or may have some influence" (EU Guidance document 2002:4). In many instances, organisations (NGOs) can represent the individual stakeholders. The Guidance recommends further that for every phase of the project the role of different stakeholders should be reviewed. To ensure transparency and trust, the Guidance also point out the importance to be able to justify why the final set of stakeholders has been prioritised.

In the case of Morsa, we recommended that also representatives of those affected by the pollution should participate on the same way as representatives for the farmers (NIVA 2003). The Morsa-project has now implemented this recommendation as an experimental scheme by involving a representative of forum for nature protection and recreation[5] in the region in the project, together with MOVAR (who is an inter-municipal organisation for the drinking water interests). I will argue that it is important that *both* those stakeholders who will be directly affected and those who may have some influence on its outcome should be representative in such deep and active participation. The argument is firstly to have as broad and good decision background as possible, and secondly because out of consideration of equal opportunities, democracy and legitimacy. In a situation where one interest is overrepresented at the expense of other interests, the participation could defeat its own end (Holsen 1996), at least in a democracy aspect. In an efficiency aspect, an asymmetric participation strategy can, under some circumstances be justifiable in the sense of ensuring better water quality. The water users and water polluters need to be turned into part of the solutions to create real changes in attitudes and in activities. In Norway, it is also been claimed that the common interests are sufficient defended by the municipality council in the planning processes.

The scale issue

According to the EU Guidance document, it follows from article 14 of the Directive that active involvement should be encourage at all scales where activities take place to implement the Directive. Nevertheless, there are good reasons for organising active public participation at lower scales. "At the local scale the effects of management will be felt most directly and more responses from especially local stakeholders can be expected in public participation is organised at this scale" (the EU Guidance document 2002:27). In the pilot-project in Morsa (NIVA 2003), we also recommended a more active form of participation at the local (municipal) scale (table 1). Our main argument for this is the opportunity to involve a broader proportion of the community that may be impacted. The input from the municipal level can also be aggregated to higher levels to take advantage of local knowledge. But, as the EU guidance point out, which scale public participation should take place is not pre-determined, and is for example depended of what kind of issues that is to be addressed. Contributions from stakeholders may differ between stakeholders and in different phases of implementations. One general advice in the EU guidance document is to organise public participation as close the public concerned as possible.

[5] This is an umbrella organisation. The stakeholders have different capacity and resources for engagement, and for NGOs with less resources and based on voluntariness, such common representatives could do easier for the such organisations to visible their interests. Such organisations could also contribute with important input in the management.

Table 1: Type of participation at different scales (NIVA 2003)

	The municipal level	**The river basin level**	**The river basin district level**
Consultation	Yes	Yes	Yes
Discussion meetings	Yes, desirable	Yes, desirable	Can be take up to consideration
Partners	Can be take up to consideration	Can be take up to consideration	No

At the river basin level, we also find it desirable to organise active participation (NIVA 2003). According to the experiences with the Morsa watershed as pilot-project, the need for active participation and co-ordination is more obvious at the river basin level compared with the river basin district level, particular when the district level consist of more river basins. The main reason for this is that the different actors will stay in a mutual symbiotic relationship to each other within the river basin level, in the sense of that the activity up streams may have impacts for actors down streams in the river basin. The need to develop mutual understanding between different actors within the river basin seems therefore to be particular important. Type of participation must also be considered with the size of the river basin. In that connection, the Morsa river basin seems to have a suitable size for active participation at the river basin level.

Our opinion is that participation as partnership is not relevant at the river basin district level, mainly because to many actors will then be involved. Active participation in form of discussion groups and reference groups etc. could, however, be appropriate. And of course, information, publication and consultation shall anyway be ensured also at this level.

Some finale remarks

Public participation is not a "magic word" for a better management and planning of river basins and participation can under some conditions even lead to less trust and more conflicts among actors (Arnesen et al 2003). Active participation is not a guarantee for real influence. In that connection, the *quality* in participation has the same importance as the quantity, and perhaps even more. In this context we may learn from the debate of communicative planning in the planning theory literature. In brief, the communicative planning is about a real and equal dialog and communication between different actors, and to build a mutual understanding of each others arguments and perception of reality (Harvold 2002). Completely equal influence for all participants is, in most cases, not realistic and it is important to communicate clearly the opportunities and limitations to the participators to avoid disappointment..

Experience with local planning processes in Norway indicate that participation also can lead to even more power to already powerful actors, as for example land owners and others with established privileges to land and water (Naustdalslid 1993). Actors who represent important common interests are not always organised (see the discussion under: "Who should be involved?"). It that connection, it is important with a careful assessment about what is the objective of any participation, which actors should be involved and how should they be involed.

Based on these considerations it proves that participation is very important, both from the point of democracy and from the point of efficiency in how to meet desired water quality objectives. Active participation and involvement is particular an important tool for changing attitudes and make water users and water polluters accountable for environmental issues.

2.6.6. References

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3. Main conclusions

On the basis of discussions and presentations some conclusions was summarized:

Country	Problem	Procedural approach	Important issues to consider
Norway	Actionplan for better water quality	municipalities and farmer organisations, in dialogue themes wastewater, agriculture, outdoor life	try to describe process in detail
Sweden	Individual sewage rainwater disconnection forestry and water	who is stakeholder (what in own language ?) what is politicians role examples participation forest owners	roleplay with perspectives -listing stakeholders/problems -stakeholders cause problems and they can solve them -heart and brains
Holland	Struggle for wetland de leyen	what kind of nature do people want how to fit in recreational aspects	-take your planning time -from top down to public involvement
Denmark	Example lake project Vilsted	'workmens hut' before a political decision is made	2 way communication -giving answers -mapping of ideas/wishes
Scotland	Example Ythan river	local initiative for actionplan as a start restoration and agricultural use of river catchment	raise awareness what people can do themselves involve in decisions, in science and in practical work involve children/schools

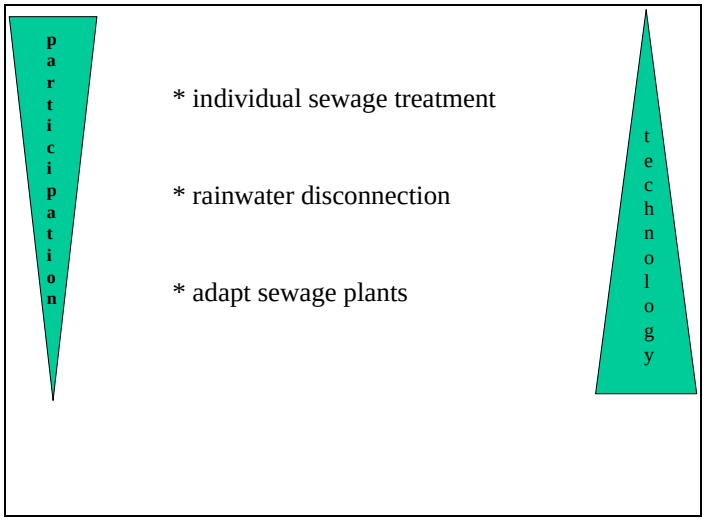

Figure 12. Involvement is related to how related each individual is to the topic. This example illustrate that one may be more concerned about the handling of 'my sewage' than 'design of large technological advanced treatment plants'.

Other experiences expressed in the discussion was:

- real decision making is badly accepted in political system
- participation is a time consuming activity
- always consider
  - how to set the framework for decision making
  - how to avoid false expectations
  - how to get representative spreading of project
  - how to communicate progress
  - how to get a project into mainstream
  - who is the public/what is the stakeholder?
  - how to get the public participation?
  - what is up to the public to decide?
- think simple: picture in regional papers, use local people on pictures in brochures, public corner on website, picture of the month, feedback on international meetings
- involve local people in monitoring
- stimulate international exchange of stakeholders, schools

In Scotland, availability of funding options is improved if one succeed in creating good public participation in a project.

4. Workshop on water quality criteria - 7th of October 2003

4.1. Introduction

The session on Water Quality Criteria was chaired by Per Schriver (Nordjyllands Amt, Denmark). The starting point for discussions was a number of questions made available in the invitation to the workshop:

1. How to divide water bodies into natural, artificial and heavily modified water bodies?
2. What is reference condition and minor deviation from reference condition defined?
3. How to define a water body type?
4. What is good ecological status?
5. What are the relationships between water quality and water quantity?
6. What are water quality criteria for groundwater?

One of the most pressing environmental issues facing the European Union and its member states today is the deterioration of water quality. Water is simply one of the most intrinsic resources that permeate both human and natural environments. Yet urbanisation, industrialisation, intense agricultural land use, and aquaculture severely threaten the stability and viability of these important water resources and the ecosystems they support. The WFD intends to prevent the further degradation of aquatic ecosystems, while at the same time protecting and enhancing existing water quality. However, the directive introduces a new focus on "ecological status" for surface waters and "ecological potential" for heavily modified water bodies. This emphasis on ecology presents a particular challenge since water has traditionally been assessed on the basis of its key chemical parameters. Yet the WFD calls for the assessment of ecological status based on a number of biological quality elements supported by water chemistry parameters. The guidance document released in 2002/2003 establishes an overall framework to guide water resource managers and planners in implementing the WFD. However, because existing conditions and limitations vary by region and by catchment, the proposed methodology must be adapted to local needs and pressures. To then provide a basis of comparison between regions, water quality indices (Ecological Quality Ratios - EQR's) will be developed to relate current water conditions to good/reference conditions.

Regarding both surface and ground waters, monitoring programs should have the objective of providing a 'coherent and comprehensive overview of water status within each River Basin District'. A key component of such monitoring strategies is to determine which water quality and ecological indicators are most representative of and sensitive to the specific pressures to which the water body or group of water bodies is subjected. The three main groups of water quality elements identified as necessary to classify the ecological status of a water body are the biological, hydromorphological, and physico-checmical quality elements. At the same time, water quality monitoring should be used to denote the spatial and temporal variability of the water body's condition. Eventually, monitoring data can be compiled to assess long-term changes in water quality and ecological conditions in response to changes in anthropogenic activities. Ultimately, the monitoring programs are essential to the assessment of whether or not the WFD's environmental objectives can and will be achieved.

4.2. Workshop results

As the guidelines on typology and classification in general still were absent, it was not possible to be concrete on what quality criteria and classification will be used in the different pilot areas. Instead an overview on the national implementations of the WFD was made.

Table 3. Status of national implementation of WFD.

Elements of WFD	**UK**	**NL**	**NO**	**SE**	**DK**
WFD implemented in national legislation?	Yes	No	No	Proposal for law exist	Proposal for law exist
Water Districts	1	4	Not defined	Not defined	13 proposed
Water District authorities defined?	Yes	Yes	No	No	Proposal exist
Guidelines on typology, classification and reference conditions?	No	Proposal exist	Proposal exist	No	No

Anne Lyche Solheim and Theo Claassen presented the present quality criteria of Norway and the Netherlands, and their expectations for the changes that will be imposed by the WFD.
The powepointpresentation is available under 'Water quality' on www.wfd-service.com

Simon Langan and Hans Oscarsson talked on the progress in their respective pilot areas, concerning the concrete action taken.

Kirsten Brock described how the ecological quality objectives have been changed to acceptable loading using empirical modeling.

The problems of groundwater quality in respect of WFD is only included in the Danish pilot area.

4.3. Short presentation on experiences – Mariager Fjord, Denmark (Kirsten Broch)

Mariager Fjord is placed on the east coast of Jutland. It is 36 kilometres long. The fiord consists of two parts – the inner part which is deep (up to 30 metres) and the outer part which is shallow with a natural channel. In the inner part there is always a bottom layer without oxygen. The top layer of Mariager Fjord is eutrophic with a big growth of algae and risk of deoxygenation.

Figure 13. Mariager Fjord.

Mariager Fjord forms the boundery between the County of North Jutland and the County of Århus and is therefore administrated in cooperation between the two counties.

In the water quality plan for Mariager Fjord one of the objectives is an average secchi depth for the summer time of 4 metres.

For the present (the 90'ties) the secchi depth lies between 2.4 metres and 3.9 metres with an average of 2.9 metres. It is estimated that an improvement of the secchi depth till an average of 4 metres will be a measurable improvement.

In Mariager Fjord the secchi depth is a measure for the amount of phytoplankton in the water and is thereby a good indicator for the present stadium of the water quality. When the amount of phytoplankton is reduced it will mean an improved condition for both oxygen and light in the fiord and the risk of extensive deoxygenation will deteriorate.

Studies in the Mariager Fjord during the 80'ties and 90'ties have concordantly shown that the amount of nutrients coming from land and thereby the growth of phytoplankton has a crucial importance for the water quality.

Table 4. Ecological status and agreed objectives

Ecological status	Objectives	Present status
Distribution of eelgrass	Widespread at depths exceeding 2 meters	Not widespread
Summer transparency (Secchi depth)	Minimum 4 meters	2.9 metres
Oxygen	More than 4 mg/l till 10 m of depth all year	Not fulfilled

The question therefore is – how big a reduction in the loading of nutrients from land is necessary in order to reach the objective – a secchi depth of 4 metres.

In order to obtain a secchi depth of 4 metres in Mariager Fjord the Counties of North Jutland and Århus have asked DMU (Danish National Research Institute) as a consultant to make a model consisting of an empiric relation between the secchi depth and the load of nutrients from land.

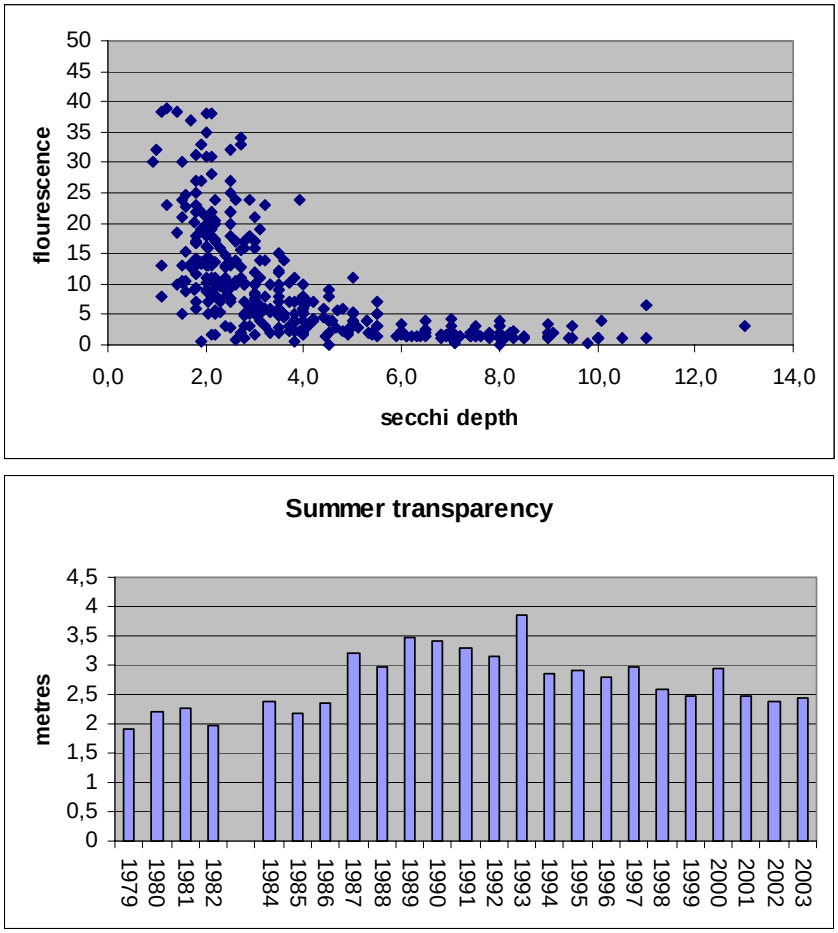

Figure 14. Secchi depth contra flourescence and summer transparency in the Mariager Fjord.

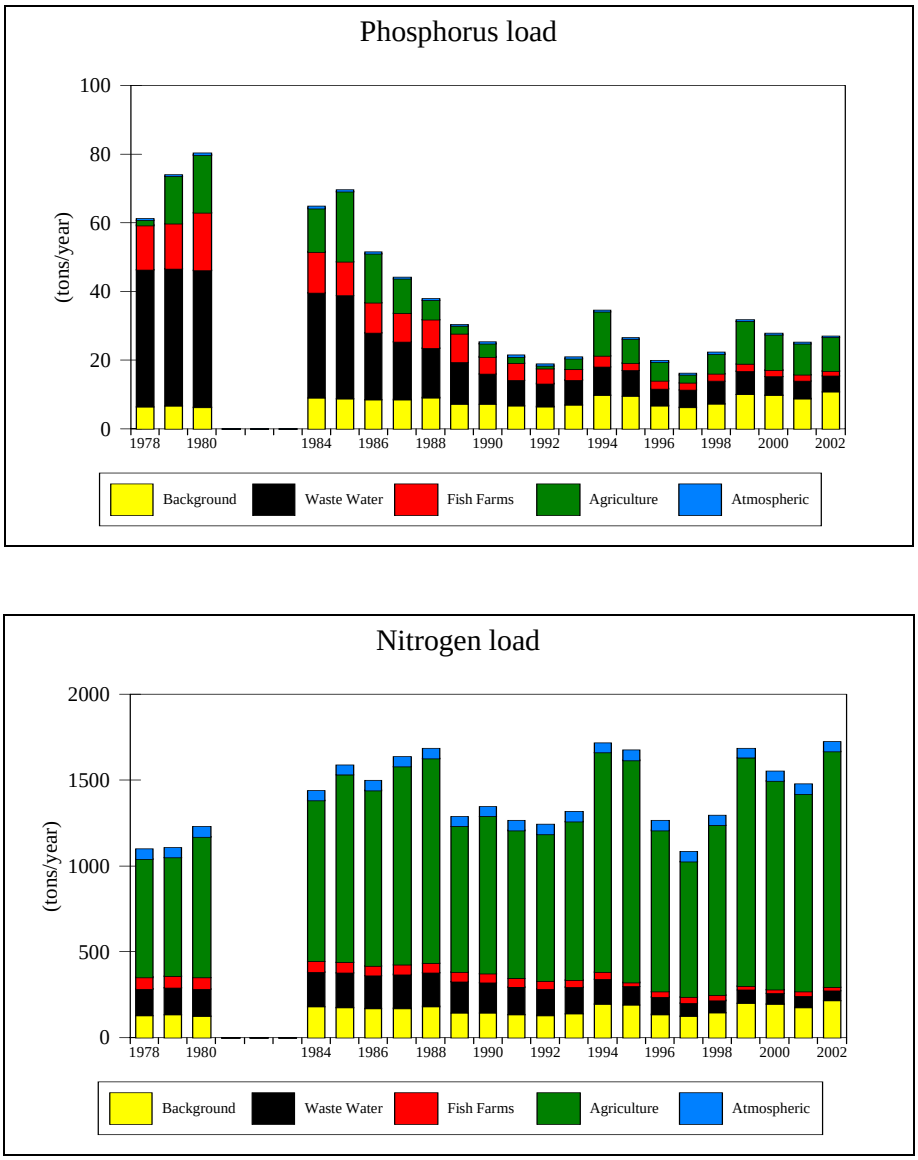

Figure 15. Long time series of nutrient load constitute a solid base for abatement planning.

In the model the following parameters are taken into account: secchi depth, data for climate (temperature, wind, influx of light), oxygen concentration and loadings from land of nutrients (Nitrogen and Phosphorus). The model is of a linear multiple regression type.

The results from the model show that the objective can be obtained from several combinations of N and P loadings from land. DMU has made a spreadsheet with the expression so we can make different combinations of loadings ourselves.

When the final combination has been decided it will be obtained through different initiatives on land, e.g. more forest, different forms of agriculture etc.

The whole process in this project is in accordance with the WFD. Our next aim is to work out concrete plans for the catchment area of Mariager Fjord in order to secure that the objectives are reached.

4.4. Typology and characterisation of water bodies in Norway (Anne Lyche Solheim, NIVA, Norway)

Norway is not a member of the European Union, but is committed to most EU regulation through the European Economic Area (EEA) agreement. Natioanl adaptions to the Water Framework Directive and connected guidance documents is ongoing and some preliminary results from the 'characterisation of Norwegian waterbodies' was presented at the NOLIMP-workshop in Moss.

The objective of the characterisation is to identify water bodies at risk of failing the WFD objective of good status.

The main procedure consist of a number of steps:
1. Collection of data
2. Identification of water bodies
3. Identification of potentially Heavily modified water bodies
4. Identification of types and reference cond. for all water bodies in the catchment
5. Identification and assessment of pressures
6. Identification and assessment of impact
7. Synthesis: Assessing risk of failing the objective of good status

Identification of water bodies.
Each waterbody must:
- belong to only one water category (river, lake, coastal waters)
- represent a limited, homogenous and considerable part of surface water
- not overlap with other water bodies
- belong to only one type of water body
- belong to only one ecological status class

Identification of the 'type' for each waterbody include:
- geographical location, altitude, size, geology (Ca, colour), slope
- reference conditions
- from pristine sites
- identification of potentially HMWB
- hydromorphological data (water flow variation, water level fluctuations etc.)
- pressure analysis
- main drivers, pollution, physical impacts, future plans
- impact analysis
- phytoplankton, benthic flora, benthic fauna, fish, physico-chemical and hydromorphological data

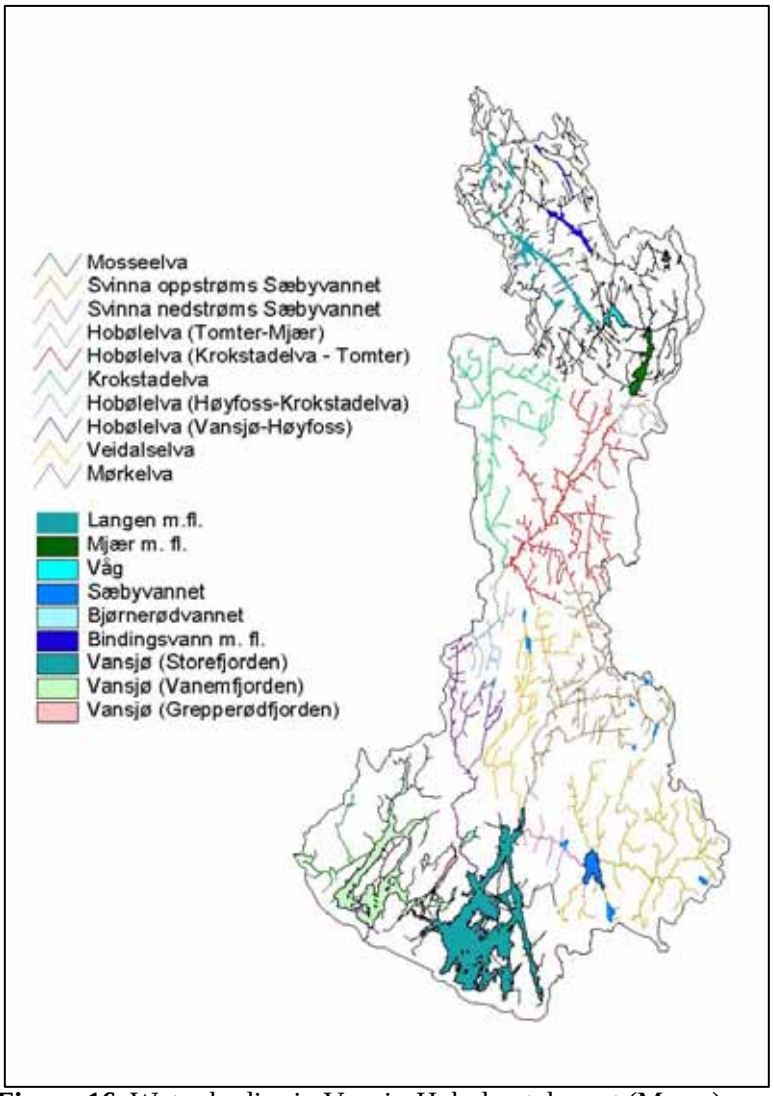

Figure 16. Water bodies in Vansjø-Hobøl-catchment (Morsa).

A large proportion of Norwegian watercourses has been subject to construction of hydropower installations and criteria for designating such waterbodies as 'potentially heavily modified water bodies' creates discussion in Norway. Proposed criteria for an assessment of 'potentially heavily modified water bodies'may look like:

- water level fluctuations in lakes: > 5m
- channelisation: > 30% of total river reach
- water flow in river: < 50% of normal low water flow

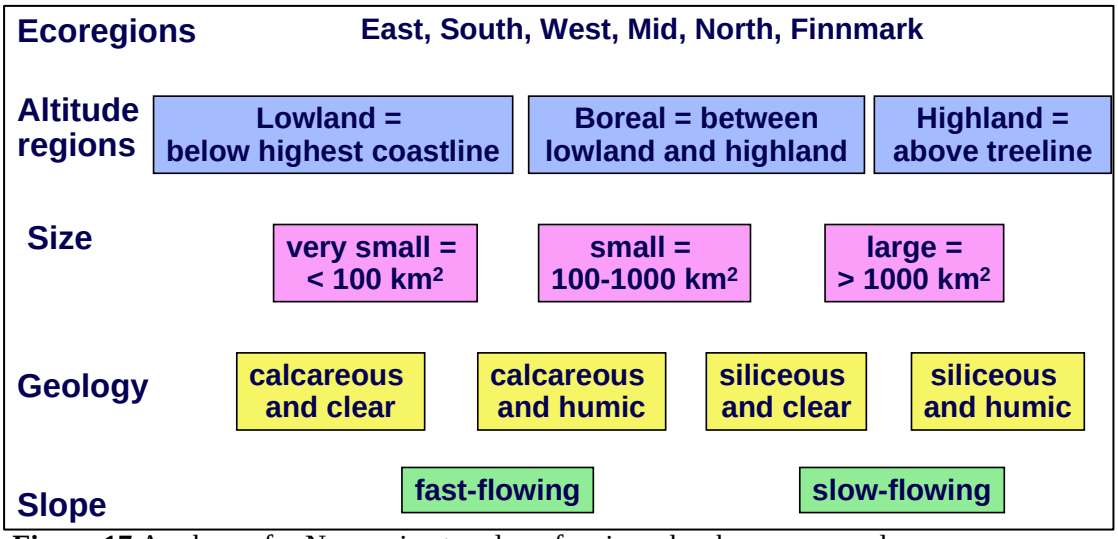

Figure 17.A scheme for Norwegian typology for rivers has been proposed.

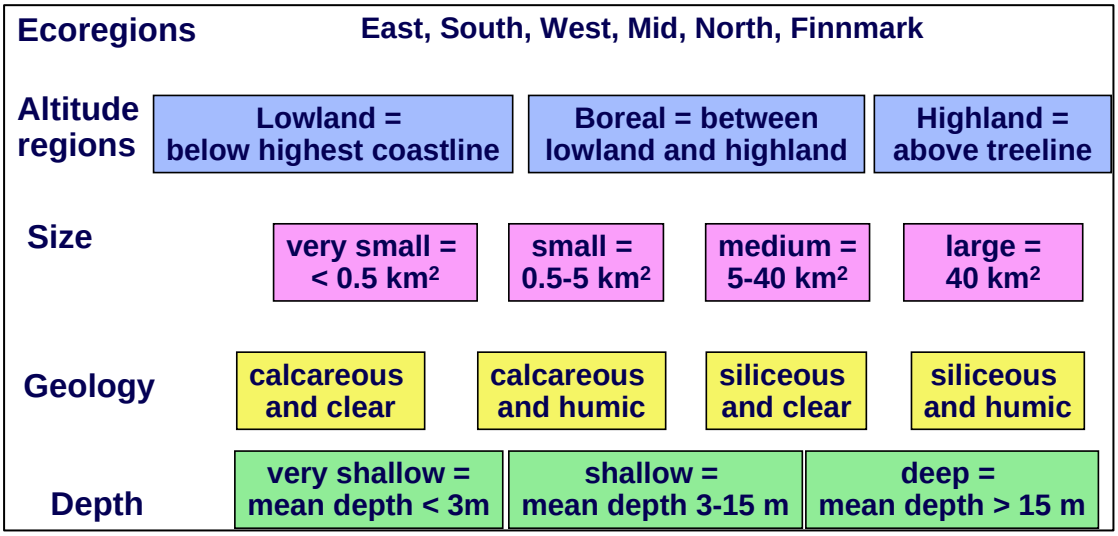

Figure 18.A scheme for Norwegian typology for lakes has been proposed.

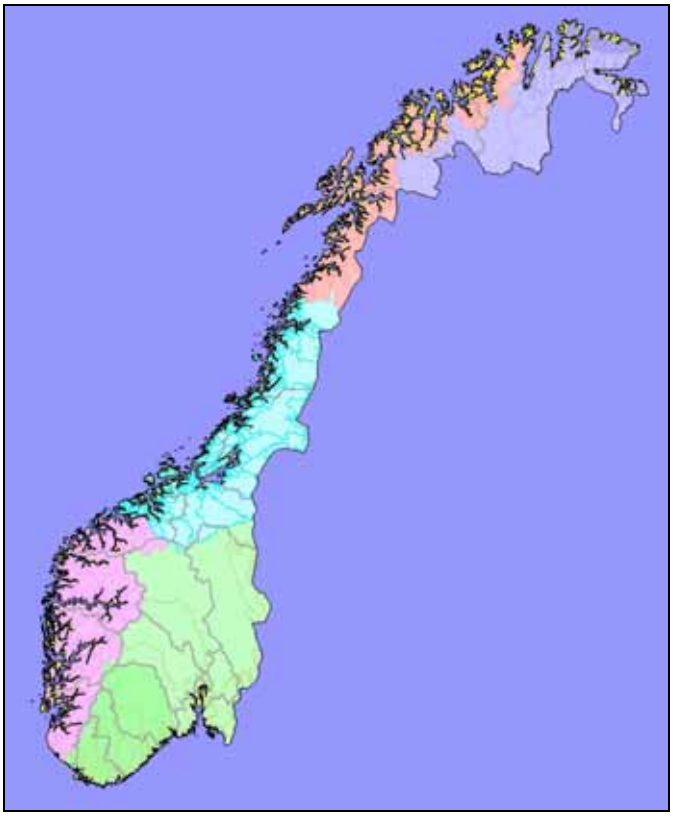

Figure 19. Norwegian typology – ecoregions.

Table 5. Result of applying the scheme on the Morsa catchment.

	Water bodies - Lakes	Altitude	Area km^2	Ca^{2+} mg/L	Colour mg Pt/L	Mean depth, m	Water body type
	Bindingsvann	Boreal	0,6	3,4	31	?	small, siliceous, humic
	Langen	Lowland	1,6	3,6	81	6	small, siliceous, humic
	Våg	Lowland	0,9	4,0	57	?	small, siliceous, humic
	Mjær	Lowland	1,7	4,3	57	6,5	small, siliceous, humic
	Sæbyvannet	Lowland	1,5	3,2-4,2	63	7,8	small, siliceous, humic
	Bjørnerødvann	Lowland	< 0.5	10,1	62	?	small, calcareous, humic
	Vansjø, Storefjorden	Lowland	22	4,4	58	9,2	large, calcareous, humic
	Vansjø, Vanemfjorden	Lowland	14	5,9	49	3,7	large, calcareous, humic
	Vansjø, Grepperødfjorden	Lowland	< 5	> 4?	>30?	< 3?	small, calcareous, humic

Reference condition need to be defined in order to refer present status to a situation with limited deviation from an undisturbed situation.
Two optional methods may be applied:

- Type-specific fact-sheets are developed for most Norwegian types of rivers and lakes. Fact-sheets contain type-specific fauna, flora and physico-chemical elements from lakes in pristine areas.
- For lake types situated on marine deposits, no reference sites exist today. Site specific ref.cond. can be estimated from models (i.e. MEI-model)

Some reference criteria are proposed for Norway:

- total phosphorus < 5 µg/L
- chlorophyll a < 1.5 µg/L
- pH > 6.0
- harmful algae < 10% of total phytopl. biomass

- agricultural area < 5% of catchment
- population density: < 5 p.e./km2
- water level fluctuations: < 1 m
- channelised part of river reach: < 10%

An analysis of pressure need to be included in the characteriastion of the waterbodies:
The pressure analysis should follow the following procedural steps:
For each water body:
1. identity important pressures;
2. evaluate present magnitude of the identified pressures;
3. make prognosis for future pressures according to plans that change the pressures, and
4. assess whether the different pressures are expected to be small, moderate or large in 2015

Local pollution	**Long-range trans-bound. poll.**	**Hydro-logical pressure**	**Morpho-logical pressure**	**Biological**
Agriculture Waste water Industry	Acid rain	Water flow regulation Water withdrawal	Damming Channel-isation	Introduced species Fishing

Analysis of impact is the next issue to consider. It may include elements like
- Biological elements: Phytoplankton, benthic algae, macrophytes, benthic fauna, fish
- Physico-chemical elements: Nutrient status, acidification status, oxygen, turbidity, secchi-depth, organic matter, temp., conductivity
- Hydromorphological elements: Water flow, retention time, water level fluctuations, river bank structure

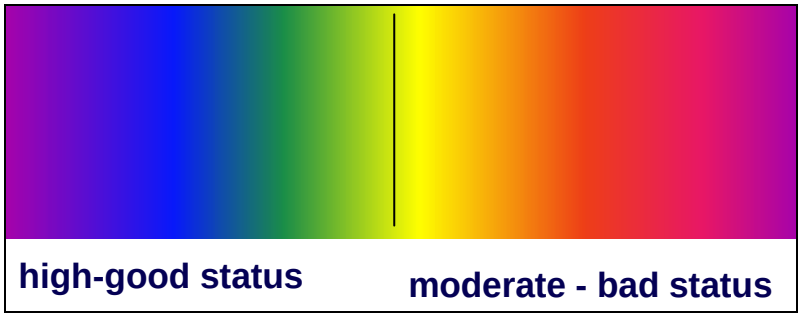

Figure 20. The impact analysis may either be based on a) use existing classification system combined with expert judgement on ref. cond., or b) assess Ecological Quality Ratio (EQR).

Pressure criteria	Impact criteria	Risk assessment
+	+	high
+	-	high
-	+	high
-	-	low

Figure 21. Scoring system for pressure- and impact criteria.

Assesssing the risk of not meeting the target depend on number of pressure and impact criteria and a simple scoring system as described in figure 8 may be applied.

Applying the described procedure on the Morsa catchment resulted in the following overview of which part of the catchment was considered to be at risk and whic part was not at risk:

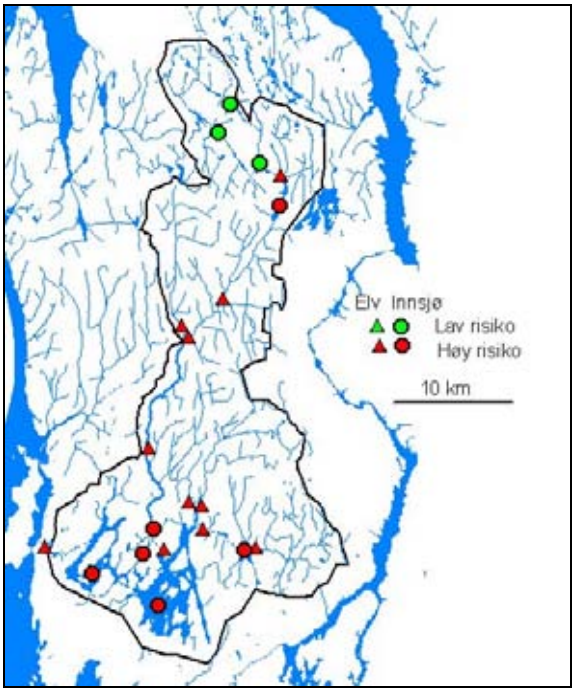

Figure 22. Waterbodies at risk (red) and not at risk (green) in the Morsa catchment.

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